

## Footwear With A Lace Fastening

### Technical Field of the Invention

The present invention relates to footwear with a lace fastening, and more particularly to footwear with elongated uppers and improved lacing.

### 5 Background Art

A field of particular interest for the application of the invention is that of sport boots such as snow-boarding, trekking, and skating boots and the like. These types of sport boots have uppers that are quite stiff and elongated and the fastenings of which have to satisfy the conflicting requirements of quick and effective tightening and  
10 equally quick and effective loosening. However, the technical teachings provided by the invention are applicable to footwear of different types with preferred use in boots which require a fairly long fastening and a fairly stiff upper.

Amongst the known advantages of lace fastenings is that of creating a homogeneous closure for the foot along the entire extent of the edges of the access  
15 opening of the footwear. However, to achieve this, each of the edges of the footwear must carry a respective plurality of lacing eyes arranged fairly close together. Arranging the lacing eyes close together, however, leads to an increase in the angle formed by the lace as it extends into and out of the eyes, which in turn causes greater friction between the lace and the lacing eyes. For this reason, it is not generally  
20 possible to fasten (or, on the other hand, to loosen) the fastening simply by exerting a pull on the ends of the lace, but it is necessary to pull on intermediate portions of the lace in order to distribute the pulling load along the entire fastening. Lacing-eye devices and members of particular shapes and designs have been investigated to minimize the effects of the friction between the lacing eyes and the lace. For example,  
25 lacing eyes provided with pulleys, with resin inserts having a low coefficient of friction, or with curved profiles have been produced but, in parallel with possible advantages in terms of the ability of the lace to slide, all these involve other disadvantages. In particular, these special devices are bulky and/or delicate and therefore respond poorly either to the need for strength for heavy uses and/or for use in difficult environmental  
30 conditions, or to the more typically decorative requirements of the footwear. Moreover, their efficacy in reducing the above-mentioned friction is only partial, to the extent that it is not normally possible, even with relatively short fastenings, to tighten the footwear simply by pulling on the ends of the laces.

US Patent Publication No. 2003/0034365A1 and US Patent No. 6,467,195 describe sports footwear with lace fastenings in which the two ends of the lace converge in a grip for preventing soreness of the user's hand during the tightening of the fastening.

5 US Patent Publication No. 2003/0051374 A1 describes a double-lace fastening in which all of the ends of the laces extend through a single edge of the fastening and converge in a strap which in turn can be fixed releasably to the footwear upper beyond the opposite edge. This fastening is suitable exclusively for shoes with a limited number of lacing eyes since it does not permit a high lacing tension to be exerted on  
10 the ends of the laces. It also causes non-homogeneous lacing tensions on the two laces since they follow different paths and are of different lengths. In practice, various shapes of users' feet cause a different length of lace to be engaged in the lacing eyes according to the position occupied along the opening to be closed so that, once the fastening is closed, the free ends of the laces are not necessarily of equal length.

#### 15 Brief Summary of the invention

An advantage of the present invention is that of providing footwear the fastening of which is designed structurally and functionally to prevent all of the problems discussed above. These problems are solved by the invention of footwear with a lace fastening having an opening with a first edge and a second edge which are  
20 juxtaposed and each of which carries a respective plurality of lacing eyes, and at least two laces extending through respective pairs of the lacing eyes. The ends of both of the laces converge on both of the edges of the opening, with at least one end of each lace extending through a respective end lacing eye of the fastening provided on each of the opposite edges.

#### 25 Brief Description of the Drawings

The characteristics and the advantages of the invention will become clearer from the detailed description of a preferred embodiment thereof which is described by way of non-limiting example with reference to the appended drawings.

- Figure 1 is a front elevational view of a boot according to the invention with the  
30 fastening open.

- Figure 2 is a front elevational view of the boot of Figure 1 during the closure of the fastening.

- Figure 3 is a front elevational view of the boot of Figure 1 with the fastening closed, .
- Figure 4 is a schematic view of a variant of the boot according to the invention with a different threading of the ends of the laces.

#### Detailed Description of the Invention

5 In the drawings, a boot formed in accordance with the present invention is generally indicated as 1. The boot 1 is of the type used for the sport of snow-boarding but the invention is applicable equally effectively to the production of footwear of other types.

10 The boot 1 comprises an upper 2 with a sole 3 and an opposed entrance 4 for the fitting-on of the boot. An opening 5 is formed in the upper 2 and has juxtaposed edges indicated 5a, 5b. A tongue 6 extends from the lower end 8 of the opening 5 as far as the entrance 4 and is optionally provided with padding 7. A lacing eye 9 with two channels 10a,b is provided in the opening 5 in the region of its lower end 8.

15 Respective pluralities of lacing eyes 11a,b, 12a,b, 13a,b, 14a,b, 15a,b, 16a,b, 17a,b are fitted in corresponding and facing positions on the respective edges 5a, 5b (by convention, the lacing eyes on the edge 5a are marked with the letter "a" and the lacing eyes fitted on the edge 5b with the letter "b"). The lacing eyes 17a,b will be referred to below as the end lacing eyes of the fastening.

20 A first lace and a second lace, indicated 20 and 21, respectively, are engaged in the lacing eyes 9 and in the further lacing eyes 11a,b to 17a,b in the manner indicated below. The ends of the laces, 20, 21, meaning the portions of the laces which extend beyond the end lacing eyes 17a,b, are also engaged in respective locking devices 22a,b, for example, of the constricting type.

25 The two laces 20, 21 extend through alternate lacing eyes of the two series of lacing eyes in a manner such that, between two lacing eyes of the same edge through which the first lace extends, there is at least one lacing eye of the same edge through which the second lace extends. Both of the laces 20, 21 also extend through respective channels 10a, 10b of the lacing eye 9 and through the two end lacing eyes 17a,b of the fastening. In the embodiment of Figures 1 to 3, the first lace 20 is therefore engaged  
30 in the lacing eyes 9, 11a-b, 13a-b, 15a-b and 17a-b, crossing between the lacing eyes 11-13, 13-15, and 15-17 (a-b). The second lace 21 is in turn engaged in the lacing eyes 9, 12a-b, 14a-b, 16a-b and 17a-b, crossing between the lacing eyes 12-13 and

14-16 (a-b). At the exit from the fastening, a corresponding end of each of the two laces is led through a respective end lacing eye.

In the embodiment of Figure 4, both of the corresponding ends of the same lace are led through the same end lacing eye 17a,b so that both ends of the first lace are  
 5 led through the end lacing eye 17a and both of the ends of the second lace are led through the opposite end lacing eye 17b. In this second embodiment, it is necessary to provide a further return lacing eye 18 between the lacing eyes 16 and 17.

Since the portions of each lace engage alternate lacing eyes, for a given "closeness" of the lacing eyes, a smaller angle is formed where the lace extends into  
 10 and out of the respective lacing eye, resulting in less friction between the laces 20, 21 and the lacing eyes.

The sliding of the laces through the lacing eyes is thus considerably facilitated without, however, prejudicing the uniformity of the fastening tension. This characteristic, together with the fact that the lace tensioning function is distributed over  
 15 two separate laces and is consequently halved in comparison with conventional fastenings, makes it possible to close the entire fastening simply by exerting a pull on the ends of the laces, without distributing the tightening load manually over intermediate portions of the fastening (that is, without "pulling" the intermediate loops of the laces manually). Since corresponding ends of the two laces converge on  
 20 opposite edges of the opening 5, the laces can be tensioned independently of the shape of the foot, or of the extent of the opening 5. Moreover, the fastening can be closed to the desired tension in a pulsed manner, that is, by firstly exerting a greater tension on one pair of ends of the laces, for example, those converging on the right-hand edge of the upper and then a corresponding greater tension on the other pair of ends  
 25 converging on the left-hand edge, alternating the pulls applied and overcoming the friction to the best possible extent.

According to another characteristic of the invention, the free ends of the laces 20, 21 are joined together at the ends to form a closed loop in which the joined ends of the laces form respective grips 23 for facilitating the pulling and tightening of the  
 30 fastening. This arrangement enables the fastening to be closed even when wearing gloves and in any case by exerting a more effective pull without painfully stressing the fingers, as shown in Figure 2.

Moreover, with the boot thus designed, there is no longer any need to close the fastening progressively so that the use of open (generally hook-shaped) lacing eyes is

superfluous. Since closed lacing eyes can be used (in the embodiment shown lacing eyes of the type with a tape loop sewn to the upper are shown) the laces remain engaged therein even when the fastening is loosened which makes it possible to wear the boot and walk in it with the laces fully loosened, without the free ends hampering  
5 movement.

Although, on the one hand, to fasten the footwear, it suffices to exert a tension on the ends of the laces by means of the grips 23 and to lock the constricting locking devices, on the other hand, the operation to loosen the footwear is just as quick and easy and requires purely loosening of the constricting locking devices in order for the  
10 lace to slide through the lacing eyes with little friction, reducing the fastening load.

Finally, to prevent undesired loosening of the fastened boot and to prevent the hindrance due to the free ends of the laces, when the fastening is tightened, the two ends can be knotted together as shown in Figure 3.

The boot may be equipped with two or more laces, arranged with different  
15 alternating arrangements in the lacing eyes. Moreover, the constricting locking devices may be fixed to the upper or may be free relative thereto.